Calculus AB

5-5

Bases other than *e*

Solve the equation accurate to three decimal places. (pg 368)

26) $5^{6x} = 8320$

$\ln 5^{6x} = \ln 8320$

$\frac{6x \ln 5}{6 \ln 5} = \frac{\ln 8320}{6 \ln 5}$

$x = \{.935\}$

34) $\log_4 \sqrt{x-4} = 3.2$

$(4^{3.2})^2 = \sqrt{x-4}^2$

$4^{6.4} = x-4$

$4^{6.4} + 4 = x$

$\{7135.550\} = x$

Find the derivative of each function.

41) $f(x) = 4^x$

$F(x) = e^{x \ln 4}$

$F'(x) = \ln 4 \, e^{x \ln 4}$

$= \ln(4) \cdot 4^x$

Rule

$F(x) = B^x$

$F'(x) = \ln B \cdot B^x$

43) $y = \log_3 x$

$\ln 3^y = \ln x$

$y = \frac{\ln x}{\ln 3}$

$\frac{dy}{dx} = \frac{1}{x \ln 3}$

$F(x) = \log_b x$

$F'(x) = \frac{1}{x \ln b}$

Use logarithmic differentiation to find $\frac{dy}{dx}$.

59) $y = (x-2)^{x+1}$

$\ln y = \ln (x-2)^{x+1}$

$\ln y = (x+1) \ln (x-2)$

$y \left(\frac{1}{y} \frac{dy}{dx} \right) = \left(\ln(x-2) + \frac{(x+1)}{(x-2)} 1 \right) (x-2)^{x+1} \cdot 1$

$= \ln(x-2)(x-2)^{x+1} + (x+1)(x-2)^x$

Find or evaluate the integral.

$u = \sin x$

$du = \cos x \, dx$

76) $\int 5^{-x} \, dx$

$-\frac{1}{\ln 5} \int -\ln 5 \, e^{\ln 5 (-x)} \, dx$

$u = -\ln 5 (x)$

$du = -\ln 5 \, dx$

$-\frac{1}{\ln 5} \int e^u \, du$

$-\frac{1}{\ln 5} e^{\ln 5 (-x)} = \frac{-5^{-x}}{\ln 5}$

82) $\int 2^{\sin x} \cos x \, dx$

$\int 2^u \, du$

$\frac{2^{\sin x}}{\ln 2}$

Rule: $\int b^x \, dx = \frac{b^x}{\ln b}$

Assignment:

Pg. 368

25-33 odd

41-87 odd